

## **CALVATIA PYGMAEA (GASTEROMYCETES) IN THE DESERTS OF BAJA CALIFORNIA SUR (MEXICO)**

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**RÉSUMÉ** — *Lanopila pygmaea*, une espèce uniquement connue par la description originelle de l'Argentine et de la Bolivie, a été récoltée 90 ans plus tard dans des aires désertiques de Baja California Sur (Mexique). Sa combinaison avec le genre *Calvatia* est proposée. Des photomicrographies au microscope optique et microscope électronique à balayage sont incluses.

**MOTS CLEFS** — *Calvatia*, *Lanopila*, Gasteromycetes, chorologie, taxonomie.

**ABSTRACT** — *Lanopila pygmaea*, a species only known by the original description from Argentina and Bolivia, has been collected 90 years later in arid areas of Baja California Sur (Mexico). Its combination with the genus *Calvatia* is proposed. Photomicrographs under LM and SEM are included.

**KEY WORDS** — *Calvatia*, *Lanopila*, Gasteromycetes, chorology, taxonomy.

### **INTRODUCTION**

In January of 1996 two of us (C.O. and G.M.) carried out an exploration of 15 days in desertic areas of Baja California peninsula, in company with members of the University of Baja California and the University of Alcalá, within a research project with the aim to compare mediterranean areas of Spain with Baja California peninsula. A large explored part is rich in Cactaceae. The important fungal diversity in these areas, mainly Myxomycetes, Gasteromycetes, and Agaricales, is very interesting from the point of view of the adaption to extreme hydric situations. At first we expected only scarce collections, but with respect to the groups mentioned above it was quite different: the diversity of Gasteromycetes was exceptionally rich and Myxomycetes were abundant.

In this paper we describe one species, *Lanopila pygmaea* R.E. Fr., which has not been collected again after its discovery by Fries (1909), and propose the combination of this taxon to the genus *Calvatia*.

## MATERIALS AND METHODS

The studied specimens are deposited in the herbarium of the University of Alcalá, Spain (AH), in the herbarium of the University of Baja California, Mexico (BCMEX), and in the personal herbarium of H. Kreisel, Greifswald, Germany.

Colour was determined with Locquin's (1975) Natural Color Guide, and the code is given in parentheses. Scanning Electron Microscope (SEM) photographs were made according to Moreno *et al.* (1995).

## DESCRIPTION

*Calvatia pygmaea* (R.E. Fr.) Kreisel, G. Moreno, C. Ochoa & Altés *comb. nov.*  
(Figs. 1-30)

Basionym: *Lanopila pygmaea* R.E. Fr., *Arkiv Bot.* 8(11): 16-17, 1909.

Material studied: MEXICO: Baja California Sur, Vizcaino, km 12 Vizcaino-Bahia Tortugas, under *Yucca valida* Brandegees and *Opuntia molesta* Brandegees, leg. G. Moreno, C. Ochoa, C. Illana, M. Lizárraga, R. Galán & N. Ayala, 26.I.1996, AH 18358 (dupl. in herb. Kreisel), Baja California Sur, near Loreto, in vegetation of Cactaceae with *O. molesta*, leg. C. Ochoa, G. Moreno, C. Illana, M. Lizárraga, R. Galán & N. Ayala, 31.I.1996, AH 21501 (dupl. in BCMEX 5481). ARGENTINA: Prov. Jujuy, Pampa Blanca, dry sandy soil in thorny bush vegetation, leg. R.E. Fries, 23.V.1901, R.E. Fries 65a, S (LECTOTYPE of *Lanopila pygmaea*). BOLIVIA: Bolivia australis, Tarija, on rather dry sandy ground under *Acacia* shrubs, leg. R.E. Fries, 11.1902, R.E. Fries 277a, S (SYNTYPE of *L. pygmaea*).

The Mexican specimens present the following features: Basidiocarps 14-25 mm diam., globose, subglobose, or irregularly globose (tuberiform) (Figs. 1-2), separating from the basal mycelium at maturity. Exoperidium about 0.1 mm thick, membranaceous, disrupting in plaques (Fig. 1), glabrous, colour silvery to silvery grey, finally silvery brown. Endoperidium 0.1-0.3 mm thick, pruinose, tomentose to velutinous, breaking irregularly at the apex (Fig. 2), colour brown to greyish brown (D6f, E5f, K4f). Gleba dark brown (A2c). Subgleba absent.

Spores 6-8 µm diam., globose, ochraceous, with thick wall in LM, smooth, with a small hyaline apiculus 1-2 µm long (Figs. 10-12); under SEM the spores are perfectly smooth (Figs. 17-21). Capillitium abundant, 3-7.5 µm diam., thick walled (wall 1-2 µm thick), without pores, branched (Fig. 4), septate (breaking at the septa), frequently sinuose, ochraceous yellow to yellowish brown, with a few narrow and long end branches which sometimes originate from the septa (Fig. 3). Septa are infrequent or very rare, variable in breadth, slightly or nearly not inflated (Figs. 6-9, 15-16). Exoperidium not

much differentiated, formed by subglobose cells and cylindric appressed filaments (structure epidermoidea). Endoperidium consisting of cylindric filaments, 5-8  $\mu\text{m}$  diam., intermixed, ramified, septate, thick walled (wall 1-3  $\mu\text{m}$  thick), brown, similar to the capillitial hyphae.

**Remarks:** *Calvatia pygmaea* belongs to *Calvatia* section *Lanopila* (Fr.) Kreisel, by lack of subgleba and imperforate capillitium (Kreisel, 1994). Within this section, *C. pygmaea* is unique by its smooth spores even under SEM.

*Calvatia pachyderma* (Peck) Morgan (another species of *Calvatia* with smooth spores) differs by its larger size (77-170 mm diam.), thicker endoperidium (1-4 mm thick), capillitium with frequent small pores, and smaller spores of 4-5  $\mu\text{m}$  diam. (Moreno *et al.*, 1996).

*Calvatia complutensis* G. Moreno, Kreisel & Altés differs by its larger size (23-70 mm diam.), exoperidium not membranaceous and not rupturing in plaques, capillitium with medium size pores, and smaller spores of (3.2-)4.8-5.6(-6.4)  $\mu\text{m}$  diam., smooth or nearly smooth under LM, but rugose to slightly verruculose under SEM (Moreno *et al.*, 1996).

Two other species with smooth spores are *Lanopila radloffiana* Verwoerd and *Calvatia diguetii* Hariot & Pat. According to our data, only the type collection of both species is known. The former was described from subtropical areas in South Africa (Bottomley, 1948) and the latter from the Californian coasts (Hariot & Patouillard, 1904). Nevertheless, we have not been able to obtain this type material of *L. radloffiana* on loan, but it has been described as having small spores of 3.4-3.8  $\mu\text{m}$  diam. (smaller than those of *C. pygmaea*). In the case of *C. diguetii* we can confirm the larger size of the basidiocarps (40-60 mm diam.), the presence of septate, very pitted capillitium, and smaller spores (3-4  $\mu\text{m}$  diam.).

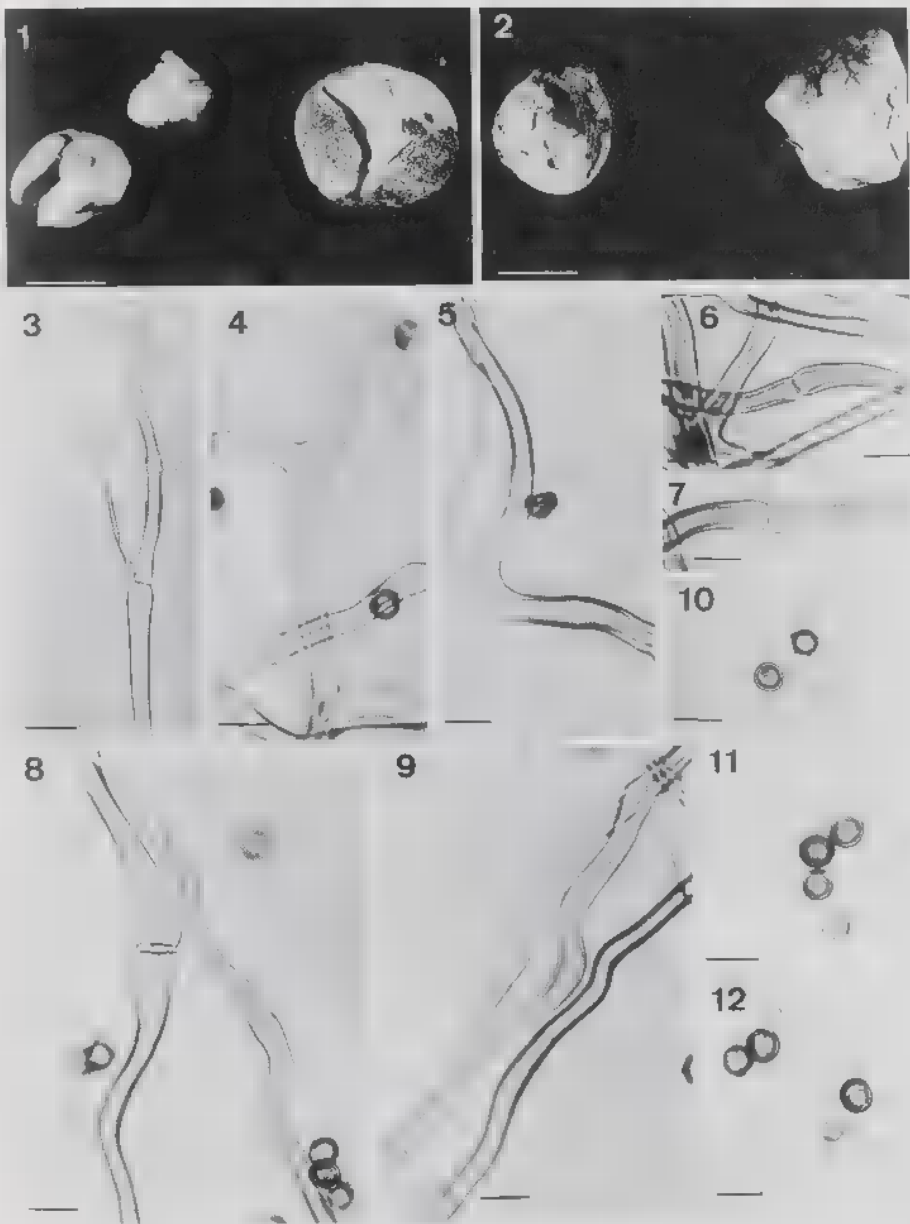
The type material studied of *Calvatia pygmaea* (S) consists of three complete basidiocarps and one fragment, measuring 7.5-10 mm diam. Macro- and microscopic characters coincide with the material from Baja California Sur (Figs. 22-30). This species was known only by the description of the type by Fries (1909), based on specimens from Bolivia and Argentina. This author did not indicate which of the two collections should be considered as type. Therefore we select as lectotype the collection R.E. Fries 65a from Argentina, which plainly coincides with the original diagnosis. The syntype R.E. Fries 277a (S) from Bolivia, one basidiocarp studied by one of us (H.K.) in 1989, has the same characters.

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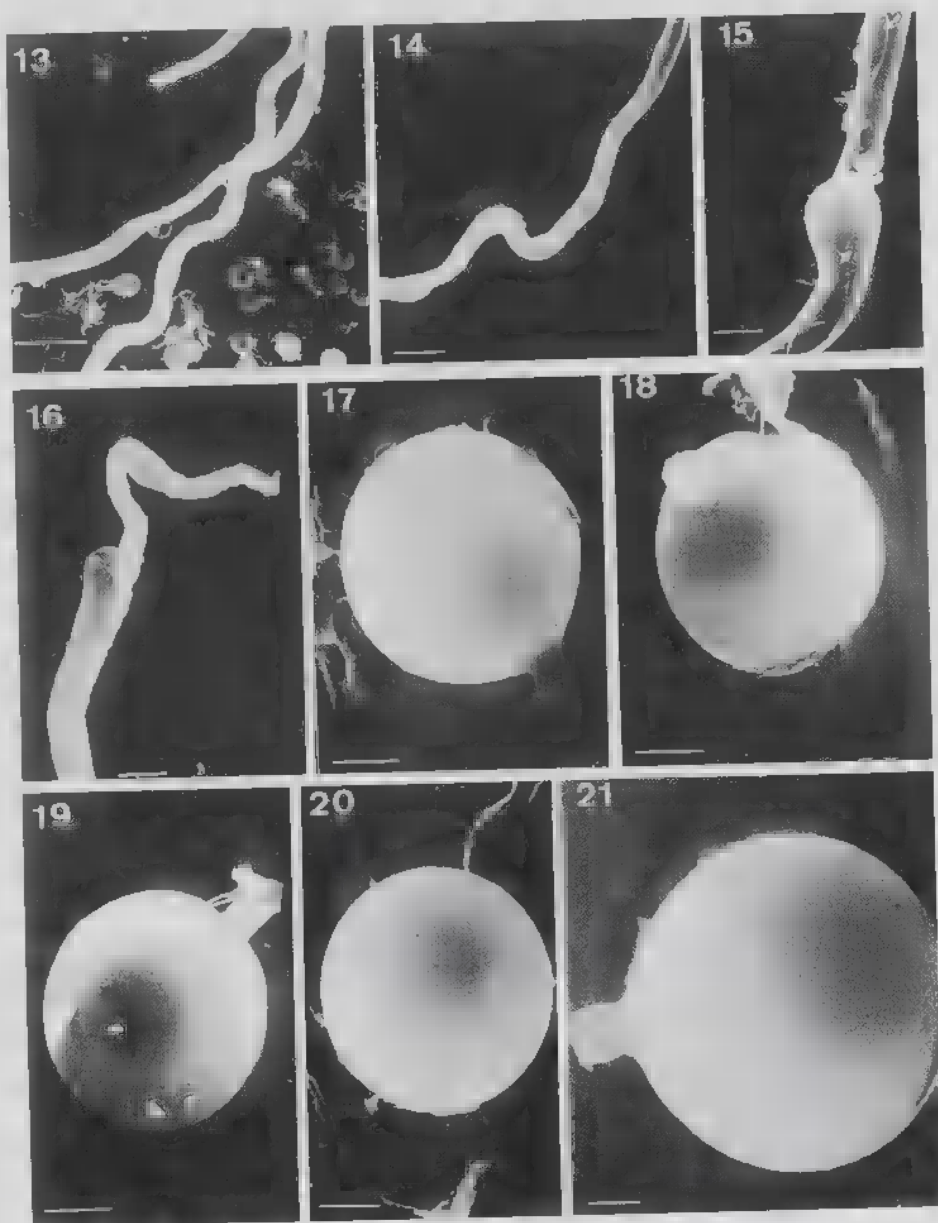
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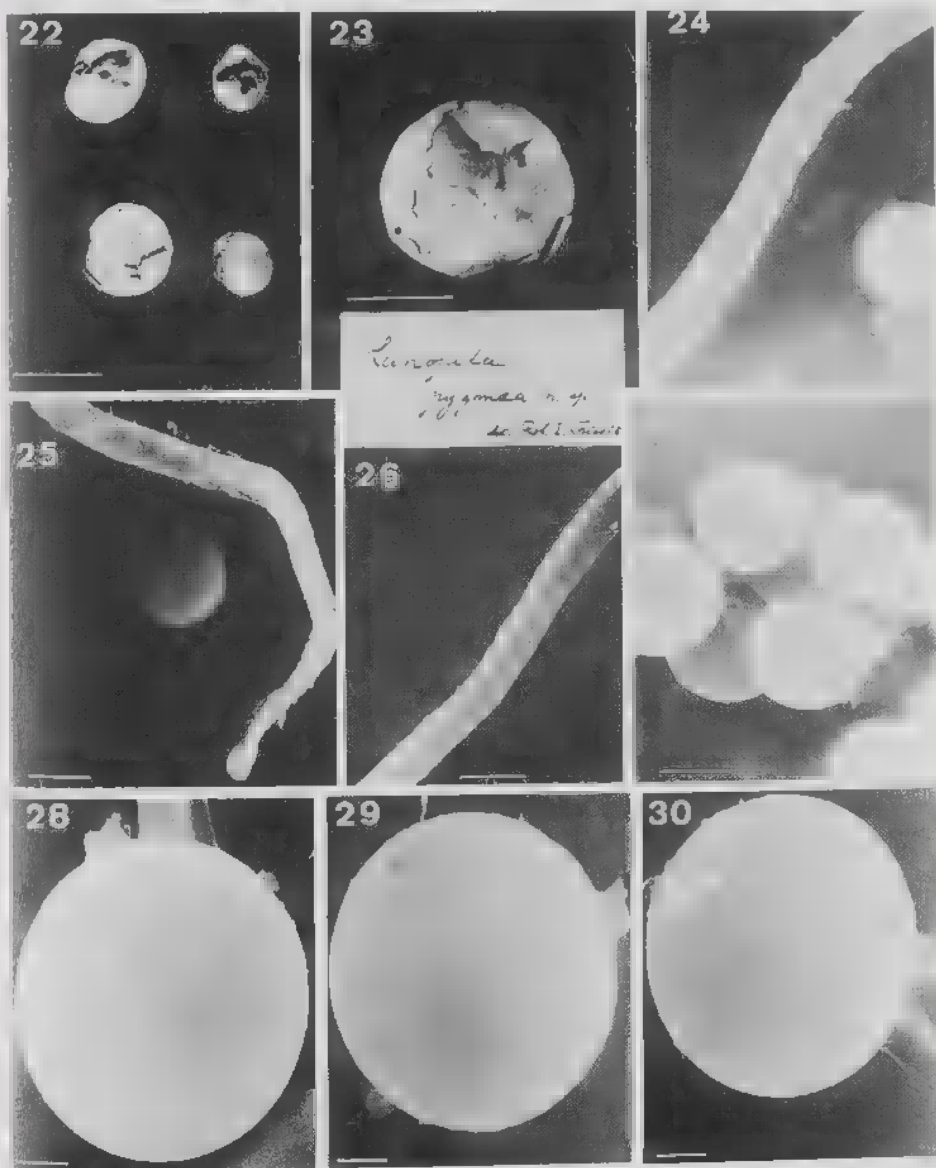
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Figs. 1-12 — *Calvatia pygmaea*. 1: Basidiocarps (AH 18358). 2: asidiocarps (AH 21501). 3-9: Imperforate capillitium showing septa and ramification (AH 18358). 10-12: Smooth spores (AH 18358). Bars: 1, 2 = 10 mm; 3-12 = 10  $\mu$ m.



Figs. 13-21 — *Calvatia pygmaea*. 13-16: Capillitium under SEM with septa (AH 18358). 17-20: Spores smooth under SEM (AH 18358). 21: Spore smooth under SEM (AH 21501). Bars: 13 = 20  $\mu$ m; 14 =



20  $\mu$ m; 15, 16 = 5  $\mu$ m; 17-20 = 2  $\mu$ m; 21 = 1  $\mu$ m. Figs. 22-30 — *Calvatia pygmaea* R.E. Fries 65a (Lectotype, S). 22-23: Basidiocarps. 24-26: Imperforate capillitium under SEM. 27-30: Spores smooth under SEM. Bars: 22, 23 = 10 mm; 24-26 = 5 mm; 27 = 10  $\mu$ m; 28-30 = 2 mm.